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Report on Tests With Skinner Gas Fumigation Treatment for the Control of Decay on Peaches

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Report on Tests With Skinner Gas Fumigation Treatment
for the Control of Decay on Peaches.

At the request of shippers two test shipments were made with Skinner gas in 1950 to determine the effectiveness of this treatment for the control of peach decay.

This fumigation or gassing treatment had been available to shippers of peaches in some areas during the 1949 and 1950 seasons. It consisted of the application of two chemicals to loaded cars of peaches. A quantity of one liquid presumably of low boiling point, was poured under the floor racks of the car and a second material was quickly vaporized on a hot plate on top of the load. The treatment was claimed to reduce decay greatly. The names of the chemicals used were not divulged by the concern promoting this treatment.

For the first test 2 fan cars of similar construction and in good condition were loaded at Fort Valley, Ga. on June 29, 1950. The check (non-fumigated) car was loaded between 1:00 and 2:15 P.M. It was intended that neither car should be precooled but the buyer demanded that the check car be precooled. It was precooled from 4:30 P.M. to 9:30 P.M. by means of a portable precooler mounted on a truck. Eighteen half bushel test packages of early Hiley peaches that were picked the previous day were placed in the car in the top layer at the doorway before precooling. The test packages of peaches were treated as follows: 4 inoculated with spores of the brown rot organisms, 4 inoculated with Rhizopus spores, 4 inoculated with anthracnose spores and 6 test packages left uninoculated two of which were wet before loading. In a few commercial shipments there were reports of injury to peaches in cars that had been fumigated. This was attributed to the fruit being wet at the time of treatment.

The car to be fumigated was loaded between 2:15 P.M. and 7:30 P.M. and the test packages placed in the car at 4:00 P.M. The test packages consisted of fruit comparable to that used in the check car and had been inoculated in the same manner. This car was not precooled but was gassed (fumigated) at 8:15 P.M. by representatives of the firm promoting this treatment.

Both cars were shipped under standard refrigeration with 3 percent salt at the first and second reicing. They were unloaded at Jersey City, N. J. on July 3. The commodity temperatures in both cars when opened were 45° F. at the top layer doorway and 41° and 40° at the bottom layer doorway. Precooling retarded the ripening of the fruit for in comparable test packages 60 to 70 percent of the peaches in the non-precooled car were ripe on arrival as compared with only 36-37 percent in the precooled car. Half of the test packages in each car were examined for decay on arrival and the same packages were examined again after 2 days at room temperature. The other packages were not disturbed until inspected after holding 2 days at room temperature. The results are presented in tables 1 to 3. As shown in the tables there was very little decay in either car on arrival. Appreciable decay (mostly Rhizopus) developed in the test lots in both cars after 2 days at room temperature. There was more decay in the gassed (non-precooled) car than in the non-gassed (precooled) car.

Precooling apparently retarded decay so that it was less in fruit from the precooled car even after 2 days at room temperature.

There was no apparent increase in decay due to the artificial inoculations. Other tests have indicated that a longer holding period is necessary for artificial inoculations to cause infections.

There was no evidence of injury to the peaches even when they were wet.

A second test shipment was made from Fort Valley, Ga. on July 5 using 2 fan cars both of which were precooled by means of portable precoolers. Loading of the check (not fumigated) car was completed by 1:15 P.M. and it was precooled from 1:30 to 6:30 P.M. Loading of the car to be treated was completed at 12:00 noon and it was precooled from then until 5:00 P.M. The fumigation treatment was applied at 6:00 P.M. Sixteen test packages of Early Hiley peaches that had been inoculated as in the earlier test were placed in the load at the top layer doorway. The wet packages used in the first cars were eliminated in this test.

The cars arrived at Jersey City on July 9. The check car was unloaded on July 10 and the test package placed in a room at 40° to 41°F. The fumigated car was unloaded on July 12 at which time the test packages from the check car were removed from the cold room. Fruit temperatures at time of unloading were 49° and 41° respectively at the top and bottom doorway positions in the check car and 46° and 39° respectively in the fumigated car.

Half of the test lots of peaches were examined for decay at the time the treated car was unloaded and after 3 days' holding at 70° they were examined and discarded and the remaining packages were examined and held another 3 days for final inspection. The results are presented in tables 4 to 6. As in the previous test there was practically no decay in either car when unloaded. After 3 days at 70° total decay averaged slightly less in the lots from the treated car (4.9 in treated vs. 6.7 in check) but the difference was not statistically significant. After 6 days at 70° total decay was rather severe in peaches from both cars and averaged 42.3 and 35.7 percent in the check and treated cars respectively. There was some indication that the treatment reduced brown rot and anthracnose from artificial inoculation and for some unexplained reason increased rot due to Rhizopus and did not affect rot due to natural infections.

In addition to the decay the fruit in 10 of the 16 lots from the fumigated car showed injury consisting of a brown discoloration affecting part of the fruit. The percentage of injured fruit ranged from 0.6 to 16.8 and averaged 5.9 in the 10 lots.

Acknowledgements:

The cooperation of M. A. W. Wilson of The American Fruit Growers Inc. who arranged for the cars for these tests is acknowledged.

The fumigation treatments were applied by representatives of the Skinner Machinery Co. Inc. of Dundee, Florida.

Table 1. Brown rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 1

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Brown rot			Total rots		
						on arrival	After 48 hr. at 70°	Cumul. Total	on arrival	After 48 hr. at 72°	Cumul. Total
					No.	%	%	%			
A	Yes	No	C-1	None	173	0.0	0.0	0.0	0.6	6.4	7.0
	"	"	C-2	"	178	.6	0	.6	.6	5.6	6.2
	"	"	C-3	"	171	--	0	0	--	5.8	5.8
	"	"	C-4	"	180	--	0	0	--	13.3	13.3
		Average						0.2			8.1
B	No	Yes	F-1	"	149	0	9.4	9.4	9.4	20.8	30.2
	"	"	F-2	"	170	0	.6	.6	2.4	8.2	10.6
	"	"	F-3	"	165	--	0	0	--	20.0	20.0
	"	"	F-4	"	165	--	0	0	--	9.7	9.7
		Average						2.5			17.6
A	Yes	No	C-5	Brown Rot	170	0	1.8	1.8	.6	10.1	10.7
	"	"	C-6	"	170	0	4.1	4.1	.6	6.6	7.2
	"	"	C-7	"	171	--	.6	.6	--	18.1	18.1
	"	"	C-8	"	175	--	8.0	8.0	--	13.1	13.1
		Average						3.6			12.3
B	No	Yes	F-5	"	165	0	3.0	3.0	1.2	18.7	19.9
	"	"	F-6	"	165	0	1.2	1.2	.6	11.5	12.1
	"	"	F-7	"	167	--	.6	.6	--	13.8	13.8
	"	"	F-8	"	164	--	1.2	1.2	--	15.2	15.2
		Average						1.5			15.3

Table 2 Rhizopus rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 1

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Rhizopus rot			Total rots		
						on arrival	After 48 hr. at 82°F	Cumul. Total	on arrival	After 48 hr. at 82°	Cumul. Total
					No.						
A	Yes	No	C-1	None	173	0.6	3.5	4.1	0.6	6.4	7.0
	"	"	C-2	"	78	0	3.4	3.4	.6	5.6	6.2
	"	"	C-3	"	171	--	5.3	5.3	--	5.8	5.8
	"	"	C-4	"	180	--	10.0	10.0	--	13.3	13.3
		Average						5.7			8.1
B	No	Yes	F-1	"	149	7.4	9.4	16.8	9.4	20.8	30.2
	"	"	F-2	"	170	.6	2.9	3.5	2.4	8.2	10.6
	"	"	F-3	"	165	--	15.8	15.8	--	20.0	20.0
	"	"	F-4	"	165	--	7.9	7.9	--	9.7	9.7
		Average						11.0			17.6
A	Yes	No	C-9	Rhizopus	169	.6	10.7	11.3	.6	14.3	14.9
	"	"	C-10	"	161	0	3.7	3.7	1.2	5.5	6.7
	"	"	C-11	"	202	--	3.5	3.5	--	6.0	6.0
	"	"	C-12	"	168	--	18.5	18.5	--	21.5	21.5
		Average						9.3			12.3
B	No	Yes	F-9	"	162	1.2	30.9	32.1	1.2	33.3	34.5
	"	"	F-10	"	171	2.3	19.3	21.6	2.3	19.3	21.6
	"	"	F-11	"	163	--	30.7	30.7	--	32.5	32.5
	"	"	F-12	"	171	--	18.7	18.7	--	21.0	21.0
		Average						25.8			27.4

Table 3. Anthracnose rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 1

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Anthracnose rot			Total rots		
						on arrival	After 48 hr. at 82°F	Cumul. total	on arrival	After 48 hr. at 82°	Cumul. total
					No.						
A	Yes	No	C-1	None	173	0.0	2.3	2.3	0.6	6.4	7.0
	"	"	C-2	"	178	0	0	0	.6	5.6	6.2
	"	"	C-3	"	171	--	0	0	--	5.8	5.8
	"	"	C-4	"	180	--	2.2	2.2	--	13.3	13.3
		Average						1.1			8.1
B	No	Yes	F-1	"	149	2.0	0	2.0	9.4	20.8	30.2
	"	"	F-2	"	170	1.8	0.6	2.4	2.4	8.2	10.6
	"	"	F-3	"	165	--	0.6	0.6	--	20.0	20.0
	"	"	F-4	"	165	--	0	0	--	9.7	9.7
		Average						1.3			17.6
A	Yes	No	C-13	Anthracnose	170	.6	.6	1.2	.6	6.1	6.7
	"	"	C-14	"	154	.6	0	.6	.6	7.1	7.7
	"	"	C-15	"	165	--	.6	.6	--	3.0	3.0
	"	"	C-16	"	167	--	0	0	--	4.2	4.2
		Average						.6			5.4
B	No	Yes	F-13	"	165	0	2.4	2.4	1.2	25.4	26.6
	"	"	F-14	"	169	0	.6	.6	.6	8.3	8.9
	"	"	F-15	"	166	--	0	0	--	17.5	17.5
	"	"	F-16	"	173	--	1.2	1.2	--	12.7	12.7
		Average						1.1			16.4

Table 4. Brown rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 2

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Brown rot				Total rots			
						on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total	on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total
					No.	%	%	%	%	%	%	%	%
C	Yes	No	C-1	None	158	0.0	0.6	--	0.6	0.0	11.4	--	11.4
	"	"	C-2	"	165	0	0	--	0	1.2	3.0	--	4.2
	"	"	C-3	"	170	--	.6	2.4	3.0	--	5.9	18.3	24.2
	"	"	C-4	"	175	--	0	0	0	--	4.0	9.2	13.2
		Average					0.3		.9		6.1		13.3
D	"	Yes	F-1	"	137	0	.7	--	.7	0	2.9	--	2.9
	"	"	F-2	"	160	0	0	--	0	.6	1.9	--	2.5
	"	"	F-3	"	166	--	0	0	0	--	6.6	21.1	27.7
	"	"	F-4	"	168	--	0	.6	.6	--	.6	15.5	16.1
		Average					0.2		.3		3.0		12.3
C	"	No	C-5	Brown rot	159	0	3.8	--	3.8	0	5.7	--	5.7
	"	"	C-6	"	167	0	8.4	--	8.4	0	11.4	--	11.4
	"	"	C-7	"	166	--	6.6	39.5	46.1	--	13.2	53.3	66.5
	"	"	C-8	"	167	--	11.4	27.6	39.0	--	16.2	42.6	58.8
		Average					7.6		24.3		11.6		35.6
D	"	Yes	F-5	"	163	.6	3.7	--	4.3	.6	4.3	--	4.9
	"	"	F-6	"	155	0	3.2	--	3.2	0	6.4	--	6.4
	"	"	F-7	"	168	--	10.1	23.2	33.3	--	10.1	25.6	35.7
	"	"	F-8	"	155	--	9.7	22.6	32.3	--	11.6	25.2	36.8
		Average					6.7		18.3		8.1		21.0

Table 5. Rhizopus rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 2

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Rhizopus rot				Total rots			
						on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total	on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total
C	Yes	No	C-1	None	158	0.0	7.6	--	7.6	0.0	11.4	--	11.4
	"	"	C-2	"	165	0	2.4	--	2.4	1.2	3.0	--	4.2
	"	"	C-3	"	170	--	1.8	4.1	5.9	--	5.9	18.3	24.2
	"	"	C-4	"	175	--	0	1.7	1.7	--	4.0	9.2	13.2
		Average					3.0		4.4		6.1		13.3
D	"	Yes	F-1	"	137	0	1.5	--	1.5	0	2.9	--	2.9
	"	"	F-2	"	160	.6	.6	--	1.2	.6	1.9	--	2.5
	"	"	F-3	"	166	--	5.4	13.9	19.3	--	6.6	21.1	27.7
	"	"	F-4	"	168	--	0	6.5	6.5	--	.6	15.5	16.1
		Average					1.9		7.1		3.0		12.3
C	"	No	C-9	Rhizopus	169	0	1.2	--	1.2	0	3.0	--	3.0
	"	"	C-10	"	165	0	2.4	--	2.4	0	3.0	--	3.0
	"	"	C-11	"	164	--	3.7	7.3	11.0	--	5.5	12.7	18.2
	"	"	C-12	"	158	--	3.2	8.2	11.4	--	6.3	22.2	28.5
		Average					2.6		6.5		4.5		13.2
D	"	Yes	F-9	"	169	0	0	--	0	0	0	--	0
	"	"	F-10	"	157	0	5.1	--	5.1	0	5.1	--	5.1
	"	"	F-11	"	165	--	10.9	33.3	44.2	--	12.1	36.3	48.4
	"	"	F-12	"	140	--	7.9	25.7	33.6	--	11.5	36.5	48.0
		Average					6.0		20.7		7.2		25.4

Table 6. Anthracnose rot and total rots in test lots of peaches shipped in gassed and non-gassed cars from Fort Valley, Ga. to New York City. Test No. 2

Car	Precooled	Gassed	Lot No.	Inoculation Treatment	Total Fruit	Anthracnose rot				Total rots			
						on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total	on arrival	After 3 days at 70°	After 6 days at 70°	Cumul. Total
					No.	%	%	%	%	%	%	%	%
C	Yes	No	C-1	None	158	0.0	0.0	—	0.0	0.0	11.4	—	11.4
	"	"	C-2	"	165	1.2	.6	—	1.8	1.2	3.0	—	4.2
	"	"	C-3	"	170	—	0	6.5	6.5	—	5.9	18.3	24.2
	"	"	C-4	"	175	—	1.7	5.2	6.9	—	4.0	9.2	13.2
		Average					.6		3.8		6.1		13.3
D	"	Yes	F-1	"	137	0	0	—	0	0	2.9	—	2.9
	"	"	F-2	"	160	0	1.3	—	1.3	.6	1.9	—	2.5
	"	"	F-3	"	166	—	0	1.2	1.2	—	6.6	21.1	27.7
	"	"	F-4	"	168	—	.6	1.8	2.4	—	.6	15.5	16.1
		Average					.5		1.2		.6		12.3
C	"	No	C-13	Anthracnose	179	0	.6	—	.6	0	3.4	—	3.4
	"	"	C-14	"	164	0	0	—	0	0	4.3	—	4.3
	"	"	C-15	"	167	—	2.4	44.3	46.7	—	6.0	48.5	54.5
	"	"	C-16	"	170	—	.6	64.7	65.3	—	4.1	70.0	74.1
		Average					.9		28.2		4.5		34.1
D	"	Yes	F-13	"	166	0	0	—	0	0	0	—	0
	"	"	F-14	"	168	0	0	—	0	0	.6	—	.6
	"	"	F-15	"	170	—	0	23.6	23.6	—	2.4	26.6	29.0
	"	"	F-16	"	165	—	0	32.1	32.1	—	1.2	42.3	43.5
		Average					0		13.9		1.1		18.3